



Faculty of Engineering

**A STUDY ON THE IMPLEMENTATION OF JUST-IN-TIME  
(JIT) MANUFACTURING IN SARAWAK MANUFACTURING  
INDUSTRIES**

Dominic Raphael anak Main

Bachelor of Engineering with Honours  
(Mechanical Engineering and Manufacturing Systems)  
2004

TS  
155  
D671  
2004



BORANG PENYERAHAN PROJEK TAHUN AKHIR

Judul: **A STUDY ON THE IMPLEMENTATION OF JUST-IN-TIME  
(JIT) IN SARAWAK MANUFACTURING INDUSTRIES**

SESI PENGAJIAN: **2003/2004**

Saya **DOMINIC RAPHAEL ANAK MAIN**

mengaku membenarkan projek\* ini disimpan di Pusat Khidmat Maklumat Akademik, Universiti Malaysia Sarawak dengan syarat-syarat kegunaan seperti berikut:

1. Hakmilik projek ini adalah di bawah nama penulis melainkan penulisan sebagai projek bersama dan dibiayai oleh UNIMAS, hakmiliknya adalah kepunyaan UNIMAS.
2. Naskah salinan di dalam bentuk kertas atau mikro hanya boleh dibuat dengan kebenaran bertulis daripada penulis.
3. Pusat Khidmat Maklumat Akademik, UNIMAS dibenarkan untuk membuat salinan untuk tujuan pengajian.
4. Projek hanya boleh diterbitkan dengan kebenaran penulis. Bayaran royalti adalah mengikut kadar yang dipersetujui kelak.
5. \*\*Sila tandakan ( ✓ ) di kotak yang berkenaan.

☐

SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

☐

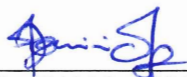
TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan dimana penyelidikan dijalankan)

☒

TIDAK TERHAD

Disahkan oleh



(TANDATANGAN PENULIS)



(TANDATANGAN PENYELIA)

Alamat Tetap: LOT 153, LRG 6, KPG  
SEMABA, JALAN BATU KITANG,  
93250 KUCHING, SARAWAK.

MAGDALENE ANDREW MUNOT  
(Nama Penyelia)

Tarikh: 15-04-2004

Tarikh: 15/4/04

CATATAN \* Projek dimaksudkan sebagai Projek Tahun Akhir bagi Ijazah Doktor Falsafah, Sarjana dan Sarjana Muda.

\*\* Jika projek ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/ organisasi berkenaan dengan menyertakan sekali sebab dan tempoh kertas projek ini perlu dikelaskan sebagai SULIT atau TERHAD.

## Approval Sheet

This project report entitled **“A STUDY ON THE IMPLEMENTATION OF JUST-IN-TIME (JIT) MANUFACTURING IN SARAWAK MANUFACTURING INDUSTRIES”** was prepared and submitted by Dominic Raphael anak Main as a partial fulfillment of the requirement for the degree of Bachelor of Engineering with Honours (Mechanical Engineering and Manufacturing System) is hereby read and approved by:



Magdalene Andrew Munot

Supervisor

Faculty of Engineering

Universiti Malaysia Sarawak



Date

# **A STUDY ON THE IMPLEMENTATION OF JUST-IN-TIME (JIT) MANUFACTURING IN SARAWAK MANUFACTURING INDUSTRIES**

P.KHIDMAT MAKLUMAT AKADEMIK  
UNIMAS



1000125784

**DOMINIC RAPHAEL ANAK MAIN**

This project is submitted in partial fulfillment of  
the requirements for the degree of Bachelor of Engineering with Honours  
(Mechanical Engineering and Manufacturing System)

Faculty of Engineering  
UNIVERSITI MALAYSIA SARAWAK  
2004

- Production management  
- Just-in-time systems

For my beloved father and mother

## ACKNOWLEDGEMENT

The author wishes to express his sincere thanks and gratitude to Mdm. Magdalene Andrew Munot for her supervision, valuable advice and assistance in conducting this study. The author thanks her for the times spend in helping develop and correct the ideas regarding the study. With her guidance, the author learnt a lot of new things and skills especially in the data analysis.

The author also would like to thanks Mr. Victor Jonathan and Mr. Ling Wan Yew for sharing the information needed in this study. Both of them give many suggestions to the author while conducting this study. The author also thanks them for their support and assistance.

With this opportunity, the author also would like to wishes his appreciation to the staffs of the Universiti Malaysia Sarawak and all the individuals that have help the author directly or indirectly in conducting this study. The author also gives sincere thanks to the companies who participate and giving cooperation in this study.

Finally, the author would like to express his gratitude to his family for their support and encouragement in finishing this report.

## **ABSTRACT**

Globalization and intense competition in the current marketplace have forced many firms to reexamine their methods of doing business. Nowadays, customers are demanding for high quality product and concern with on time delivery. Therefore the intention of this study is to highlight the use of Just-In-Time (JIT) manufacturing and how it can benefits manufacturing firms especially the manufacturing firms in Sarawak. This is because JIT manufacturing has been proved to results in competitive advantage by providing quality products and reducing cost mostly from inventory. There are three areas that will be looked thoroughly in this study which are; pre-implementation phase of JIT manufacturing, implementation phase of JIT manufacturing and post-implementation phase of JIT manufacturing. For this study, the data are collected using the mail survey method. Survey packages consist of introduction letter, questionnaire and self-return envelop were distributed to 58 selected companies. 14 out of 58 companies responded to this study. Using the data obtained from 14 manufacturing firms in Sarawak, this study empirically examines JIT manufacturing practices of the firms. Amongst the 14 companies, only four companies implement JIT manufacturing. The discussion of pre-implementation phase will be based on four set of questionnaires while the discussion on the implementation phase and post-implementation phase will be based on three set of questionnaires since one company is still in the pre-implementation phase. The results show that JIT implementation improves performance by lowering the inventory level, reducing costs and results in greater customer responsiveness. This study indicates that JIT manufacturing is a vital manufacturing strategy to build and sustain competitive advantage.

## ABSTRAK

Globalisasi dan persaingan sengit dalam dunia perniagaan masa kini telah memaksa banyak kilang pembuatan mengkaji semula kaedah untuk kekal bersaing. Pada masa kini, para pelanggan lebih mementingkan kualiti produk dan penerimaan produk tepat pada masanya. Maka, tujuan kajian ini dijalankan adalah untuk menerangkan kepentingan pembuatan '*Just-In-Time (JIT)*' dan bagaimana ia dapat memberi manfaat kepada kilang pembuatan khususnya kilang pembuatan di Sarawak. Ini kerana pembuatan *JIT* telah dibuktikan dapat meningkatkan daya saing dengan menghasilkan produk yang berkualiti serta mengurangkan kos terutamanya kos yang berkaitan dengan inventori. Dalam kajian ini, terdapat tiga bahagian yang akan dibincangkan secara terperinci iaitu; fasa pra-implementasi pembuatan *JIT*, fasa implementasi pembuatan *JIT* dan fasa selepas implementasi pembuatan *JIT*. Untuk kajian ini, maklumat dikumpul dengan kaedah kajiselidik secara pos. Pakej kajiselidik ini mengandungi surat pengenalan, soalan soalselidik dan sampul surat pemulangan dan pakej ini telah diedarkan kepada 58 buah kilang pembuatan yang dipilih dan 14 buah kilang memberi maklumbalas. Berdasarkan maklumat yang diperolehi daripada 14 buah kilang pembuatan di Sarawak, kajian ini menyelidik praktis pembuatan *JIT* di kilang berkenaan. Daripada 14 buah kilang pembuatan, hanya empat yang mengimplementasi pembuatan *JIT*. Perbincangan mengenai fasa pra-implementasi berdasarkan empat set soalselidik dan perbincangan mengenai fasa implementasi dan fasa selepas implementasi berdasarkan tiga set soalselidik kerana sebuah kilang masih dalam fasa pra-implementasi. Hasil kajian ini mendapati bahawa implementasi pembuatan *JIT* meningkatkan prestasi dengan mengurangkan inventori, mengurangkan kos serta hasil maklumbalas positif daripada pelanggan. Kajian ini menunjukkan bahawa pembuatan *JIT* merupakan satu strategi untuk meningkatkan daya saing.



## TABLE OF CONTENTS

	Page
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
ABSTRAK	
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
<b>CHAPTER 1            INTRODUCTION</b>	
1.0    Global Competitiveness in Manufacturing Industries	1
1.1    Just-In-Time Manufacturing	3
1.2    Problem Statements	6
1.3    Objectives of the Study	7
1.4    Scope of Study	8
<b>CHAPTER 2            LITERATURE REVIEW</b>	
2.0    Introduction	9
2.1    Global Competitiveness in Manufacturing Industries	9
2.2    JIT Manufacturing	11
2.2.1    Definitions of JIT Manufacturing	12
2.2.2    Elements of JIT Manufacturing	12
2.3    Pre-implementation Phase of JIT Manufacturing	15
2.3.1    Initiators of JIT Manufacturing Implementation	15
2.3.2    Evaluators of JIT manufacturing Implementation	16
2.3.3    Reasons for Implementing JIT Manufacturing	16
2.3.4    Pre-implementation Problems	18
2.3.5    Pre-implementation Period	20

2.4	Implementation Phase of JIT Manufacturing	20
2.4.1	The Extensiveness of JIT Manufacturing Implementation	21
2.4.2	Problems of Implementing JIT Manufacturing	22
2.5	Post-implementation Phase of JIT Manufacturing	23
2.5.1	Benefits of Implementing JIT Manufacturing	24
2.5.2	Future Extensiveness of JIT Manufacturing	27

### **CHAPTER 3            METHODOLOGY OF STUDY**

3.0	Overview	28
3.1	Survey Sample and Population	28
3.2	Data Collection Instruments	29
3.2.1	Types of Questions	32
3.3	Data Collection Method	34
3.3.1	Mail Survey	35
3.4	Data Collection Procedures	35
3.5	Received of Questionnaire	36
3.6	Data Analysis Program	36
3.7	Statistical Analysis Procedures	37
3.8	Results	37

### **CHAPTER 4            RESULTS AND DISCUSSIONS**

4.0	Introduction	38
4.1	Survey Administration and Response Rate	38
4.2	Missing responses	39
4.3	Profiles of Company	39
4.3.1	Nationality of Company	39
4.3.2	Types of Industries	40
4.3.3	JIT Manufacturing Practices	41
4.4	Pre-implementation Phase of JIT Manufacturing	43
4.4.1	Initiators of JIT Manufacturing Implementation	43
4.4.2	Evaluators of JIT Manufacturing Implementation	46

4.4.3	Reasons for Implementing JIT Manufacturing	47
4.4.4	Pre-implementation Problems	50
4.4.5	Pre-implementation Period	52
4.5	Implementation Phase of JIT Manufacturing	53
4.5.1	The Extensiveness of JIT Manufacturing Implementation	53
4.5.2	Problems Encountered in Implementing JIT Manufacturing	56
4.6	Post-implementation Phase of JIT Manufacturing	58
4.6.1	Benefits of Implementing JIT Manufacturing	58
4.6.2	Future Extensiveness of JIT Manufacturing	63

## **CHAPTER 5            CONCLUSIONS AND RECOMMENDATIONS**

5.1	Conclusions	
5.1.1	JIT Manufacturing Practices	65
5.1.2	Pre-implementation Phase of JIT Manufacturing	66
5.1.3	Implementation Phase of JIT Manufacturing	66
5.1.4	Post-implementation Phase of JIT Manufacturing	67
5.2	Recommendations	
5.2.1	Pre-implementation Phase of JIT Manufacturing	67
5.2.2	Implementation Phase of JIT Manufacturing	68
5.2.3	Post-implementation Phase of JIT Manufacturing	68

<b>REFERENCES</b>		69
-------------------	--	----

## **APPENDICES**

<b>APPENDIX A:</b>	Company List	76
<b>APPENDIX B:</b>	Survey Questionnaire	79
<b>APPENDIX C:</b>	Introduction Letter	84
<b>APPENDIX D:</b>	Reminder Letter	85

## LIST OF TABLES

Table		Page
4.1	Nationality of Company	40
4.2	Types of Industries	40
4.3	Percentage Increase and Percentage Decrease of after Implementing JIT	62

## LIST OF FIGURES

Figure		Page
3.1	Methodology of the Study	30
4.1	JIT Manufacturing Practice	42
4.2	Initiators of JIT Implementation	44
4.3	Evaluators of JIT Implementation	46
4.4	Reasons for JIT Implementation	48
4.5	Pre-implementation Problems of JIT	51
4.6	Extensiveness of JIT Manufacturing Implementation	54
4.7	Implementation Problems of JIT	56
4.8	Benefits of JIT Implementation	59
4.9	Future Extensiveness of JIT Implementation	64

## LIST OF ABBREVIATIONS

JIT	Just-In-Time
AFTA	ASEAN Free Trade Areas
ASEAN	Association of South East Asian Nation
SMI	Small and Medium Industries
WIP	Work-In-Progress
MIDA	Malaysian Industrial Development Authority
SPSS	Statistical Package for Social Science
MNCs	Multinational Corporations



## **CHAPTER 1**

### **INTRODUCTION**

#### **1.0 Global Competitiveness in Manufacturing Industries**

Manufacturing is the process of converting raw materials into marketable products and is the backbone of any industrialized nation (Kalpajian and Schmid, 2001). Stiff competition in the manufacturing industries is normal in business world nowadays and it is due to rapid changes in the business world. Advances in transportation and communication have created global competition among manufacturing industries (Hernandez, 1993). With increasing regional and global competition many manufacturing industries have learned that in order to stay competitive, they must satisfied the customers need (Kazazi and Keller, 1994). Kalpajian and Schmid (2001) state that high quality products with low prices have become common in worldwide market.

There are several factors that need to be considered in order to stay competitive. One of the factors is the economic environment of the country (Amoako-Gyampah and Gargeya, 2001). The authors also state that stable market environment influence the size of the company, products production and the management practices. This is supported by Harrison (1992) where stable market condition increases the sales volume of products. Multinational market condition also needs to be considered to remain competitive (Kalpajian and Schmid,

2001). Business world now is no longer concentrated in just one area. Through the introduction of the internet, strategy on marketing products has been changed drastically. Customers around the world can order the product online with just one click away.

Another factor that has an impact to manufacturing industries is the customers demand. Customers demanded high quality, low cost products and emphasized on in time delivery (Kalpajian and Schmid, 2001). Amasaka (2002) also stresses on product's quality to satisfy customers need. Pearson and White (2001) suggest that delivery time and performance should be given the top priority in production management efforts.

In Malaysia especially the state of Sarawak, manufacturing industries have become aware of the competition in the global market. Through the introduction of ASEAN Free Trade Areas (AFTA), manufacturing industries can prepare themselves for any challenges in the global competition (Khan and Mahmud, 2003). Small and medium scale industries (SMI) are targeted to be one of the main factors in generating and driving Sarawak towards greater economic development and higher growth (Albert, 2003). The author also said that SMI could produce higher value added products as supporting industries under the Industrial Cluster Approach.

In global competition, manufacturing industries need to cope with the rapidly changing technology (Khan and Mahmud, 2003). The authors also agree that with the help of knowledge and technology, manufacturing companies will increase its competitiveness and the production cost will be reduced due to low labour cost since automation is introduced in the firms. Chandra and Kodali (1998) state that implementing JIT can help to meet the

increasing market demand. The authors also added that JIT helps lay the foundation for a successful transition towards operations automation. Proactive measures have to be taken in order to meet the customers demand for various products variety with minimum delay (Kazazi, 1994). According to Harrison (1992), market demand can be satisfied by reducing the manufacturing lead times. This is where JIT manufacturing shows its advantage since by implementing the technique it can reduce the manufacturing lead time.

### **1.1 Just-In-Time Manufacturing**

The term Just-In-Time (JIT) is not new in other countries like Japan and Western country. Various research have been carried out on JIT practices in many countries like Ghana (Amoako-Gyampah and Gargeya, 2001), Singapore (Hum and Ng, 1994), Malaysia (Abdullah *et al.*, 1998), European country (Kazazi and Keller, 1994), Canada (Callen *et al.*, 2000), USA (Groebner and Merz, 1994; Pearson and White, 2001), Scotland (Waters-Fuller, 1996) and Australia (Power and Sohal, 2000). These research shows that JIT is adapted and recognized by firms around the world.

Just-In-Time (JIT) is a management or production philosophy which originated from Japan and first implemented by Toyota Motor Company in the early 1970s. The founder of the concept is Taiichi Ohno, executive vice president of the company (Kazazi, 1994). Since then the concept spread throughout Japan. The adaptation of JIT in the West and other country are bit slow because they are not so familiar with the concept and they also are unaware to the competitive threat which was posed (Harrison, 1992). But then the JIT concept is accepted by Western and Asian country in the early 1980s (Kazazi, 1994).

There have been many advantages reported by other researchers on the implementation of JIT manufacturing. Amoako-Gyampah and Gargeya (2001) found that the performances of Mexican firms are correlated with the implementation of JIT manufacturing. The authors explain that an organization that eliminates waste and reduces variance continuously improves its shop performance through reduction in lead time, work-in-progress, operating expenses, and throughput increases leading to excellence and growth. Their study also shows that plant size and type of production processes were found to affect the relationship between JIT and performance. Chong *et al.* (2001) states that implementation of JIT manufacturing in the US firms provide benefits such as reduced throughput time, improved labour productivity, improved employee behavior, reduced inventory level and decreased the unit cost. Yasin *et al.* (2003) also agree that implementing JIT manufacturing can reduced the inventory level, reduced investment in inventory, improved quality of incoming materials and produce consistent high quality products.

Studies have shown that JIT manufacturing implementation has achieved the following benefits: reduced raw materials stocks by 50%, increased turnover by 97%, reduced scrap by 40%, increase supplier quality by 26% and reduced supplier cost by 11% (Waters-Fuller, 1995). The finding of Biggart and Gargeya (2002) indicate that implementing JIT manufacturing reduced total inventory through reductions in raw material inventory and not through significant reductions in WIP and finished goods inventories.

Beside these advantages, implementing JIT also has its disadvantages. One of the common problems is the lack of support to implement JIT manufacturing (Waters-Fuller, 1995). The author states that supports from suppliers, top management and employees are

important to make sure that the JIT implementation is successful. These facts is supported by Amoako-Gyampah and Gargeya (2001) where they found out that when introduced in the Mexican firms, JIT manufacturing face several obstacles. The obstacles are: obstacles to achieve employee participation, obstacles to achieve supplier participation and obstacles to the managerial integration of the components of JIT.

Other problems related to the implementation of JIT manufacturing pointed out by Groebner and Merz (1994) are the technical problem involving computer integration, shop floor scheduling, accounting procedure, quality assurance issues, transportation distance problems and resistance from workers. Hum and Ng (1995) point out that other problems occurred are the problem with the interface with existing manufacturing system, lack of internal JIT expertise, lack of justification for practicing JIT, lack of available assistance from consulting firm and lack of commitment from the management.

## 1.2 Problem Statements

In today's challenging global marketplace, cost of manufacturing has become increasingly important (Lawrence and Lewis, 1996). The authors also state that in order to succeed, companies should produce high quality products and compete on the basis of price. The costs of manufacturing can be minimized by keeping low inventory levels and by having good relationship with vendors (Waters-Fuller, 1996).

Pearson and White (2001) suggest that delivery time and high quality product with reasonable price is given top priority in customers' service. According to the authors, high inventory level and delay in delivery affect the delivery performance of orders. If the customers are satisfied with the delivery time, it will enhance the relationship between customers and company and thus makes the companies continue to compete (Waters-Fuller, 1995).

Manufacturing lead times also gives an impact to the manufacturing companies in order to compete with others. Manufacturing lead times is the total times required to produce a product when the batches enter the shop floor until it becomes finished products (Yew, 2002). Reduction in lead times saves a lot of time and also cut down the cost.

Introducing JIT manufacturing in the firms will help the firms to minimize the need of raw materials, work-in-progress, products inventory by giving attention to setup time reduction, balancing productive capacities of internal processes and this will help the company to achieve highest level of quality which is the key factor for competition Amoako-Gyampah and Gargeya (2001). Implementing JIT manufacturing also give benefits such as



Work-In-Progress (WIP) reduction (Hum and Ng, 1995; Kazazi and Keller, 1994; Yasin *et al.*, 2003), inventory reduction (Hum and Ng, 1995; Duclos *et al.*, 1995; Ramarapu *et al.*, 1995; Kazazi and Keller, 1994; Mukhopadhyay, 1995; Upton, 1998; Waters-Fuller, 1996; Yasin *et al.*, 2003; Groebner and Merz, 1994) and lead time reduction (Hum and Ng, 1995; Ramarapu *et al.*, 1995; Kazazi and Keller, 1994; Mukhopadhyay, 1995; Groebner and Merz, 1994). Indeed implementing JIT manufacturing help in production space reduction (Hum and Ng, 1995; Duclos *et al.*, 1995; Kazazi and Keller, 1994; Groebner and Merz, 1994), product quality improvement (Hum and Ng, 1995; Ramarapu *et al.*, 1995; Mukhopadhyay, 1995; Callen *et al.*, 2000), productivity improvement (Hum and Ng, 1995; Duclos *et al.*, 1995; Kazazi and Keller, 1994; Callen *et al.*, 2000; Amoako-Gyampah and Gargeya, 2001).

### **1.3 Objectives of the Study**

This study presents the current status of Just-In-Time (JIT) manufacturing practices in the manufacturing industries in Sarawak. The main objectives of this study are:

1. To investigate the pre-implementation phase of JIT manufacturing
2. To investigate the implementation phase of JIT manufacturing
3. To investigate the post-implementation phase of JIT manufacturing

## **1.4 Scope of Study**

Specifically this study will look into the pre-implementation phase, implementation phase and post-implementation phase of JIT manufacturing implementation. The areas covered in this study are:

1. Initiators of JIT manufacturing implementation
2. Evaluators of JIT manufacturing implementation
3. Reasons for implementing JIT manufacturing
4. Pre-implementation problems
5. Pre-implementation period
6. The extensiveness of JIT manufacturing implementation
7. Implementation problems
8. Benefits of JIT manufacturing implementation
9. Future extensiveness of JIT manufacturing

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

The literature review will discuss on the global competition issues among the manufacturing industries and how to cope with the challenges. This literature review also will discuss and explain the study on Just-In-Time (JIT) manufacturing practices thoroughly. The areas that will be looked specifically are the pre-implementation phase of JIT manufacturing, implementation phase of JIT manufacturing and lastly the post-implementation phase of JIT manufacturing. With the explanation in this chapter, it will help the manufacturing industries especially in Sarawak to identify and evaluate the current practices of JIT manufacturing.

#### **2.1 Global Competitiveness in Manufacturing Industries**

Business world today is no longer the same as a few years ago. Nowadays the competition among manufacturing companies is stiffer than the old days. When the markets become multinational, it creates a global competition (Kalpajian and Schmid, 2001). Firms that adopt to environmental change will be most likely to find profitable activities in the market that are changing. Yew (2002) states that many manufacturing industries have to re-examine their manufacturing practices and evaluate it in order to remain competitive in the

globalization world. This statement is supported by Fullerton and McWatters (2001) where they agree that globalization and strong competition in the marketplace forced the manufacturing firms to re-examine their methods for doing business.

The introduction of ASEAN Free Trade Areas (AFTA) this year has creates a competition among the ASEAN region. According to Khan and Mahmud (2003) the major concern of ASEAN's manufacturing industries is to take advantage of the opened and liberalized ASEAN market. The authors add that they need to adjust their manufacturing practices to survive and to compete with others. This is where the JIT manufacturing practices can benefit the manufacturing companies to gain competitive advantages as stated by Waters-Fuller (1995). The findings of Fullerton and McWatters (2001) show that JIT implementation improves competitive performance by lowering inventory levels and reducing quality costs and throughput time.

Kazazi and Keller (1994) point out that the manufacturing industries must satisfied the customers need in order to remain competitive in the increasing regional and global competition. Indeed, Yew (2002) agrees that to stay competitive the important philosophy is the low cost manufacturing, product quality and customers trust. To meet the demand of customers at minimum cost, JIT manufacturing is one of the solutions (Diponegoro and Sarker, 2002). By implementing JIT manufacturing, it results in competitive advantage by reducing the cost and improved the quality of the products (Waters-Fuller, 1995). Huson and Nanda (1995) state that the lean production practices is adopted due to increasing in competitive pressure, demand for product variety and a need for flexible systems. Fullerton and McWatters (2001) state that good quality management is the key of JIT survival. Corbett